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THE EFFECTS OF POLLUTION CONTROL ON THE NONFERROUS METALS INDUSTRIES

LEAD

Part III
The Economic Impact of Pollution
Abatement on the Industry

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THE ECONOMIC EFFECTS OF POLLUTION CONTROLS ON THE NONFERROUS METALS INDUSTRY: LEAD

Prepared for
the Council on Environmental Quality

Prepared by
Charles River Associates Incorporated
16 Garden Street
Cambridge, Massachusetts 02138

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PREFACE

This report on the economic effects of pollution controls on the lead industry has been organized into three parts comprised of eight chapters. The three parts can be read separately or in conjunction with one another. Part I summarizes the contents of the succeeding two parts, providing a broad profile of the lead industry and outlining the economic effects of pollution controls on the industry. The important points and conclusions of the full report are contained in the first part, with greater detail and analysis in the following two parts.

Part II comprises separate chapters on:

Trends in supply and the technology of production
Consumption
Structure of the industry
Prices
Government policies
The lead industry in the United States

Part III is our detailed analysis of the economic effects of imposing pollution controls on on the lead industry.

Much of the information contained here was first published in Charles River Associates Incorporated, *An Economic Analysis of the Lead-Zinc Industry* (Cambridge, Mass., 1967, revised 1969), which we prepared under contract with the General Services Administration. Data presented in this report if not otherwise attributed is taken from our GSA report.

PART III

Chapter 8
ECONOMIC EFFECTS OF POLLUTION CONTROLS

The Environmental Protection Agency has proposed standards governing both the emission into the air of sulfur dioxide from lead and zinc smelters and the discharge of wastes into water sources. In addition, the EPA has estimated the costs of installing control equipment to meet these standards. It is the purpose of this chapter to present these cost estimates and to assess the impact of such costs upon the primary lead industry. The presentation of the cost estimates will be followed by a discussion of probable trends in the industry that would be observed in the absence of pollution control costs and the effects of such costs on these trends.

Cost Estimates

Table 8-1 presents data provided by the Council on Environmental Quality showing the costs that would have to be incurred by lead smelters to attain the standard

Table 8-1

COSTS OF CONTROLLING SULPHUR DIOXIDE EMISSIONS AT PRIMARY LEAD SMELTERS, RELATIVE TO THE STANDARD OF 90 PERCENT REMOVAL OF FEED SULPHUR

(Millions of August 1971 Dollars)

	1972	1973	1974	1975	1976
Investment Outlays					
Existing Facilities	3.25	6.50	22.75	26.00	6.50
Annual Costs					
Operation & Maintenance	0.40	1.21	4.03	7.25	8.06
Interest	0.33	0.98	3.26	5.86	6.51
Depreciation	0.22	0.68	2.27	4.08	4.55
Total	0.95	2.87	9.56	17.19	19.12
"Total" Costs					
Total Cash Costs[1]	3.98	8.69	30.04	39.11	21.07
Total Direct Costs[2]					

[1]Investment costs plus annual costs minus depreciation.

[2]Total cash costs minus interest.

SOURCE: Council on Environmental Quality.

ASSUMPTIONS:
(1) An acid plant whose entering gas stream is cleaned is the proposed control method.

(2) The interest rate is 10 percent.

(3) The growth rate of production from existing capacity is 1.4 percent per year.

(4) The depreication rate is 7 percent per year.

(5) No downtime for installation is envisaged.

(6) A smelter model of zero current control, producing 47,000 tons of lead per year and operating at full capacity for 330 days a year, was used for the cost calculations.

(7) The SO_2 concentration of the gas stream entering the acid plant is assumed to be 5 percent.

(8) Five lead smelters were assumed to require control.

of 90 percent removal of feed sulfur. A range of error of 10 percent lower to 25 percent higher is allowed for these costs.

Table 8-2 presents data provided by CEQ for the water pollution control costs. No range of error was provided for these estimates.

Of the pollution abatement cost figures provided by CEQ for the lead industry, the one we focus on is the total annual cost in 1976. This represents the level of annual costs which can be regarded as continuing into the long run after full installation of the required pollution abatement equipment. The capital outlays for both air and water pollution abatement of $73 million over the 1972 to 1976 period are large, and an expenditure of this magnitude by the industry may be quite painful. The companies involved are large enough, however, to be able to raise such sums if continued operation is otherwise profitable. The annual costs that persist into the long run are the costs that will affect the producers' profit rates.

The impact of these expenditures on the producers' net income will be smaller than that of ordinary capital expenditures, due to special tax and investment credit provisions for the installation of pollution control equipment. These provisions of the Tax Reform Act of 1969 permit the user to amortize the equipment over five years, regardless of its useful life. For ordinary capital expenditures the "guideline" useful life assignable to assets used by the nonferrous metals industries is 14 years, though a firm may arbitrarily use a percent

Table 8-2

COSTS OF WATER POLLUTION CONTROL FOR THE LEAD AND ZINC INDUSTRY COMBINED, RELATIVE TO THE STANDARD OF EQUIVALENT OF SECONDARY TREATMENT

(Millions of August 1971 Dollars)

	1972	1973	1974	1975	1976
Investment Outlays					
Existing Facilities	1.557	1.629	1.703	1.775	1.848
New Facilities	0.231	0.235	0.240	0.245	0.250
Total	1.788	1.864	1.943	2.020	1.098
Annual Costs					
Operation & Maintenance	0.204	0.411	0.617	0.823	1.030
Interest	0.115	0.231	0.347	0.463	0.580
Depreciation	0.071	0.143	0.217	0.289	0.362
Total	0.340	0.785	1.181	1.575	1.972
"Total" Costs					
Total Cash[1]	2.167	2.506	2.707	3.306	3.703
Total Direct[2]	1.442	2.196	2.560	3.145	3.123

[1] Investment costs plus annual cost minus depreciation.
[2] Total cash costs minus interest.

SOURCE: Council on Environmental Quality

ASSUMPTIONS:
(1) Lead and Zinc smelters would apply coagulation, sedimentation, and neutralization to 100 percent of process wastewater.
(2) The interest rate is 8 percent.
(3) The growth rate of lead production is 1.4 percent and that of zinc production is 2.2 percent per year.
(4) The depreciation rate is 5 percent per year.
(5) Some downtime for installation is included.

up to 20 percent depreciation in the first year of the asset's life. There is pending in Congress an investment credit providing for a tax reduction amounting to 7 percent of the cost of an asset. This is not a tax deduction but rather a reduction inthe tax liability by an amount of dollars equal to 7 percent of asset cost.

The combined annual costs of air and water pollution control are presented in Table 8-3.

Probable Trends in the Lead Market in the Absence of Pollution Controls

The lead market in the United States during the past two decades has been characterized by a compound rate of growth of consumption of less than 1 percent per year since 1950 and relatively stable real prices. This stable consumption pattern persisted even into the recent recession, as lead consumption suffered a relatively smaller decline than many other producing sectors. Foreign consumption of lead has shown a somewhat stronger growth trend over the same time period.

Total mining and smelting capacity have grown slightly more than has consumption, but the major change on the supply side of the lead market is a replacement of older mines and the smelters which drew upon them for concentrates by newer mines and the smelters which process their ores, and an accompanying increase in concentration. Indeed, one old smelter shut down in December 1970 and another is to close in December 1971. The major force behind this rearrangement is the discovery and development

Table 8-3

ANNUAL COSTS OF SULPHUR DIOXIDE EMISSION
AND WATER POLLUTION CONTROL
AT PRIMARY LEAD SMELTERS IN 1976

U.S. Production[2] (Tons)	Total Annual Abatement Costs ($ Million)	Middle Estimate of Abatement Cost Per Pound	Low Cost Estimate[3]	High Cost Estimate[4]
726,500	20.18	$0.014	$0.012	$0.017

[1]The annual costs of water pollution control are given for the combined lead and zinc industries. The figures in this table are based on the arbitrary allocation of half that combined figure to lead and half to zinc.

[2]The CEQ's estimated growth rate of lead -- 1.4 percent per year -- is applied arithmetically to 1970 U.S. lead coutput of 670,000 tons to yield the figure of 726,000 for output in 1976. The 1976 figure appears quite reasonable in light of our own studies of this market.

[3]The high and low cost estimates allowed the minus 10 to plus 25 percent error for air pollution control costs, and no error for water pollution control costs.

SOURCE: Tables 1 and 2.

of extensive ore deposits in Missouri, which have relatively low mining costs and which are favorably situated with respect to water transportation. These trends, which are analyzed in the earlier chapters on the organization and operation of the lead industry in the United States, form an important part of the basis for our segmentation of the domestic primary lead industry into low- and high-cost producers.

A second important change in the United States supply picture is a recent decrease in the share of imports in U.S. lead consumption. This share varied around 20 to 25 percent from 1960 to 1969, dropped to 18 percent in 1970 and was down to 15 percent from January through July 1971. This decrease in the share of imports appears also to be explained in important part by the expansion of relatively low-cost Missouri supply.

The lead market has been relatively weak from mid-1970 to mid-1971. As a result of a decline in demand -- associated with the general economic recession -- and new capacity, inventories have accumulated to larger than normal levels, price has dropped and producers have curtailed production. In recent months, however, inventories have been declining and the price decline seems to have run its course. As the U.S. economy recovers, consumption and production of lead should again increase.

In the absence of pollution controls, U.S. lead consumption can be expected to grow at a rate of about 1 percent per year assuming some loss of the tetraethyl market. However, this rate will probably be greater until about 1975 as consumption growth will begin from

a relatively depressed condition. Foreign consumption will advance at a greater rate than domestic consumption, although the normal trends may be temporarily disrupted by general economic slowdowns in particular countries. The growth will occur primarily in the battery market, as automobile production and nonhighway vehicle use expand. Batteries account for about 40 percent of domestic lead consumption.

The major uncertainty in lead consumption is the use of tetraethyl as a gasoline additive. The question has not been settled, as neither of the two main types of proposed devices - the catalytic converter and the thermal reactor have been fully developed and tested. There seems to be substantial momentum toward the adoption of the catalytic converter, which cannot operate effectively with leaded gasoline. A reasonable estimate is that the net effects of 1) new cars using lead-free gasoline, 2) reduced lead content of regular grade gasolines, and 3) probable regulations in some states will be to reduce the consumption of lead in this segment of the market by about 40 percent by 1975. This will probably reduce the growth rate of lead consumption by about 1 percent between now and 1975, and by about 2 percent thereafter. In absolute terms, the implied reduction in tons of lead consumed as gasoline additives will just about be offset, if not more than offset, by increased tonnages consumed in all other sectors. The prevailing assumption in the industry is that from 1975 to 1980 the gasoline additives market will decline by about 10 percent per year, largely as a result of

egislation that is likely to be enacted on this issue. If 40 percent of that market is lost by 1975, these further declines will probably have no impact on the growth of consumption larger than that discussed above.

The price of lead has been closely associated with average costs in real terms over the long run. Long-run costs have not risen for the industry as a whole, and indeed may have declined as mining and smelting activity has been relocating from older to newer establishments. There is no reason to expect price to rise as a result of market trends in the absence of pollution control costs and increased import barriers. Indeed in real terms price may decline somewhat.

Over the long run, price has held a fairly stable mark-up over average cost in real terms. If average costs were currently unchanged with respect to their past levels, current price would rise to about $0.15 or more after the current recession. However, because long-run average costs appear to have declined in recent years, the current price of $0.14 is probably a more reasonable choice.

It is difficult to measure precisely the relative sizes of the low-cost and high-cost sectors of the U.S. lead industry. The available data from the American Bureau of Metal Statistics *Yearbooks* and other public sources indicate, however, that the low-cost sector comprised at least 55 to 60 percent of the approximately 670,000 tons of lead smelted and refined in the United States. The relevant proportion may well be larger, as the industry is still in a state of transition. One high-cost smelter closed down in December 1970 and another

is scheduled to close down in December 1971. Both of these were relatively small producers. On the other hand, the low-cost sector may be expanding its operations. In terms of ore reserves, capital and smelter capacity adjustments available to the low-cost producers, it appears that they are capable of considerable expansion. It is by no means clear that the gradual withdrawal of high-cost producers would significantly affect the long-run size of the industry.

The Effects of Pollution Abatement Costs

Several issues are involved in assessing the impact of pollution control costs on the lead industry. The extent to which such cost increases will be translated into an increase in the market price of lead depends upon the incidence of the costs within the industry, the relation between demand and capacity, the trade policies adopted by the government and the behavior of foreign producers.

Effects on Profit Margins If There is No Increase in Price

As a first step in the analysis it is useful to analyze the effects on profit margins of lead producers if the price of lead does not rise as a result of the pollution controls. Of course, the analysis of the extent to which the lead price may increase is an important part of the impact analysis, and the information developed on profit margins in this section will be used later on analysis of the effects of the controls on price and output of lead.

In the preceeding chapter we estimated that long-run average costs for low-cost producers were $0.082 per pound.

We have no similar estimate for the long-run average costs for high-cost producers. For purposes of comparison, however, high-cost producers will be assumed to have long-run average costs of $0.12 per pound. This figure is actually the estimate obtained in earlier CRA studies for the long-run average cost of a low-cost producer in the period up to the mid 1960's.[1] Thus it probably understates the current average costs of high-cost producers and may be regarded as a lower limit to those costs.

These cost assumptions, together with the pollution control cost estimates, are presented in Table 8-4 to measure the impact of the contrasts on profits of low- and high-cost producers if the price of lead does not increase. It should be recalled that these figures are to be interpreted as being representative of the two categories of producers, as there is probably some cost variation among producers within each category, especially within the high-cost category.

There are three estimates of margins of price minus cost presented in Table 8-4. The first assumes that each smelter in the industry will incur the same pollution control cost increment as every other smelter. That is, the CEQ cost estimates are considered to be those faced by the "typical" lead smelter. Under this assumption, the low-cost producers would be able to absorb the cost

[1]The actual CRA estimate was $0.10 per pound as of 1965. Since 1965 the general price level, as measured by the GNP implicit price deflator for private production, has increased by about 20 percent. Thus $0.12 in 1971 is roughly equivalent to $0.10 in 1965.

Table 8-4

PRICES, ESTIMATED COSTS AND MARGINS FOR
LOW AND HIGH COST LEAD PRODUCERS
(dollars per pound)

	Low Cost Producers			High Cost Producers		
	Low Estimate	Middle Estimate	High Estimate	Low Estimate	Middle Estimate	High Estimate
Current Price[1]	0.14	0.14	0.14	0.14	0.14	0.14
Average Cost Without Controls[2]	0.082	0.082	0.082	0.12	0.12	0.12
Control Cost[3]	0.012	0.014	0.017	0.012	0.012	0.017
Average Cost With Controls[4]	0.094	0.096	0.099	0.132	0.134	0.137
Margins With Controls[5]	0.046	0.044	0.041	0.008	0.006	0.003
Margins Without Controls[6]		0.058			0.02	
Margins With Uneven Control Incidence[7]		0.058		-0.004	-0.008	-0.014

Footnotes on following page.

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Table 8-4 (continued)
PRICES, ESTIMATED COSTS AND MARGINS FOR
LOW AND HIGH COST LEAD PRODUCERS
(dollars per pound)

Footnotes:

[1]The current price is that prevailing in the fall of 1971 as reported in *Metals Week*. The choice of current price is discussed in the text.

[2]Average cost consists of long-run average costs as estimated in Chapter 7 of this report for low-cost producers and described in the present chapter for high-cost producers.

[3]From Table 3.

[4]Average cost without controls plus control cost.

[5]Price minus average cost with controls.

[6]Price minus average cost without controls.

[7]This assumes that the control costs are incurred only by the high-cost producers. The CEQ cost figures presented in Table 1 of this chapter assumed that 5 smelters in the United States would require control, and that these smelters have zero current control. It is not clear what smelter population the CEQ estimates were based on, as one smelter closed in December 1970 and another will close in December 1971. In any case, two low-cost producers and one high-cost producer have acid plants in operation, and it appears that at least the two low-cost smelters, if not all three of these, were excluded from the group needing control. It thus may be that the proposed control costs will fall only upon part of the tonnage produced in 1976. It is difficult to know what the correct proportions are, but based on market shares of existing smelters in 1970, it seems reasonable that about half the 1976 tonnage could be excluded from the control costs. If this is the case, then the low, middle and high control cost estimates per pound are double those presented in Table 3: $0.024, $0.028, and $0.034.

increase without an accompanying price increase, with some reduction in profits. There would probably not be any serious impairment of their ability to attract that new capital into the industry for expansion. We estimated in Chapter 7 the competitive cost of capital for this industry to bein the range of $0.015 to $0.017 per pound for this industry. The high-cost producers will also retain a positive margin of price over cost, but probably not of such a magnitude as to warrant additional investment in expansions unless there is an offsetting price increase of about $0.014 per pound -- which would leave them practically indifferent to the additional abatement costs. There is probably enough variance in the costs of this group, however, to suppose that some would be left with no positive margin. For that matter, after the closing of the Utah smelter in December 1971, at least one more of the six remaining smelters may be shut down; in fact, it is generally regarded by industry sources as being the least likely to survive, even in the absence of pollution control costs. The remaining high-cost producers would probably continue to decline in relative importance. If there is an increase in the price of lead, the high-cost sector will probably suffer in the long run from an expansion of imports. Even if there is no increase in the price of lead, the high-cost sector will probably suffer in the long run from an expansion of the low-cost sector.

The continued decline of the high-cost sector relative to the low-cost sector described for the case of evenly shared pollution control cost increments would be simply an acceleration of the trend which is now underway and which would continue in the absence of control costs. As

can be seen in the fourth line of Table 8-4, the margin of price over cost in that case would be about $0.02. This is probably enough to attract some expansion capital into those firms whose costs are below average for the high-cost group, but not enough to maintain this sector of the industry at its present relative size in the long run. Thus the major difference between the case of no abatement costs and equal sharing by all smelters of the CEQ abatement cost estimates is the speed with which the high-cost sector declines. We do not have any precise estimate of this speed. The second difference is that in the case of no abatement costs the low-cost domestic sector would gain most of the market losses of the high-cost sector, while in the case of equally shared abatement costs imports would take some of the gains, assuming some price increase.

The third estimate of margin is perhaps most likely to occur, as it is clear that individual smelters will require substantially different costs to enable them to meet the proposed standards. It is based on the eventuality that practically all the pollution control costs will fall upon high-cost producers. As is explained in footnote 4 to Table 8-4, the CEQ cost estimates assumed that no sulfur emission control was in effect at the smelters included in the group to which the costs apply. However, three smelters currently have acid plants in operation, and two of these are low-cost producers. It appears that these two low-cost producers, and perhaps all three having acid plants, were excluded from the group needing control. To take this possibility into account, about one-half of

the predicted 1976 lead production is assumed to be excluded from the control costs. This proportion is a rough extrapolation of the market shares of existing smelters in 1970. The effect of this assumption is to double the per pound cost estimates presented in Table 8-3 and to assign them to the high-cost producers.[1] This brings the fully distributed average costs to a level in excess of current price, and would induce a rather hasty exit of high-cost producers from the industry unless there were a price increase of about $0.028. This would put the price of lead at $0.168 in 1971 dollars, which is quite high relative to past trends and its occurrence very unlikely.

It is apparent from the preceding discussion of the impact of pollution control costs on the industry and its high- and low-cost sectors that the results are fairly insensitive to range of error allowed by the CEQ cost estimates. The results are much more sensitive to the question of incidence of pollution control costs.

Effects on Price

The effects on profit margins and on associated

---

[1]The low, middle, and high estimates of combined air and water pollution control costs per unit would then be $0.028 and $0.034. This makes our estimated cost increases fall within the range published by the Bureau of Mines in its Information circular 8527, *Control of Sulfur Oxids Emissions in Copper, Lead, and Zinc Smelting*, p. 53. That range was $0.02 to $0.04, and various lead industry sources have expressed agreement with these higher figures. In our analysis, however, they represent the cost increases incurred by high-cost producers.

reallocation of domestic supply from high-cost to low-cost producers were analyzed in the preceding section under conditions of a constant price at the current level. If the price of lead were to rise, however, the margins of producers would be less adversely affected.

In Chapter 5 of this report it was pointed out that, although demand and supply forces have prevented the price of lead from rising much beyond the long-run marginal cost of the industry (including a nominal rate of return on equity capital), the price of lead is to a considerable extent an administered price. There is little doubt that the low-cost producers have predominant influence upon this price. This influence rests both upon the relatively high degree of market concentration and upon the price inelasticity of demand for lead. That is, an increase in the price of lead would probably not lead to a substantial decline in industrial consumption.

The most important restraining force on price is the existence of foreign competition. Strong evidence exists, however, that foreign producers would not flood the U.S. market even if lead prices were to rise moderately.

In the past, foreign producers have shown the ability to cooperate in preventing wild swings in the market after a sudden change in outside influences. The behavior of foreign producers is best described as a rivalry for market shares without short-run predatory price cutting. If one firm comes into a favorable position through a richer deposit, for example, it will gradually expand its market share without forcing a sudden drop in price. Thus, in

the past, price changes on one continental market have been matched by price changes in other continental markets, rather than accompanied by large changes in trade flows. If the foreign sector were atomistic, there would not have been the foreign production cutbacks and surplus capacity of the past year -- output would have been diverted more to other national markets.

Thus domestic producers may decide that a price increase is appropriate in the face of increased pollution control costs. Any increase in the domestic price relative to the foreign price will probably be accompanied by some increase in the import share of U.S. consumption, an increase whose magnitude we cannot measure precisely. Presumably there is some optimal price increase -- for which the difference between gain on higher priced domestic sales and the loss on sales lost to imports is a maximum.

Given that the low cost producers have the predominant influence on price and that foreign supply is such that a moderate price increase could probably be maintained, the question is the magnitude of price increase desired by the low-cost producers. If the abatement costs fall entirely on the high-cost producers, then the low-cost producers may have no incentive to increase prices. It is doubtful that the high-cost producers could maintain a price increase without the acquiesence of the low-cost producers. If the abatement costs fall evenly upon all smelters, then the low-cost producers may have some incentive to increase prices. Although a 10 percent increase of $0.014 in price would leave low-cost producers with the same margin in the absence of

abatement cost increases, the associated long-run sales loss to imports may be unacceptably large.

Thus, if abatement costs fall evenly on all smelters, the high-cost producers could still expect a price increase of perhaps one-half of $0.014, or $0.007. This would leave high-cost producers with a margin in the range of $0.010 to $0.015, which is probably not sufficient to alter substantially the accelerated exit of some high-cost smelters. This conclusion is strengthened by the consideration that the abatement cost increases will fall more heavily upon the high-cost than on the low-cost producers. This means that the price increase sought and obtained will be lower than that which appeared likely in the equal cost incidence case.

In summary, although price can be expected to rise somewhat if the low-cost producers desire it, the probable heavier incidence of the control cost increases upon high-cost producers will leave the low-cost producers seeking only small, if any, price increases. Thus it is not likely that price increases will substantially alter the trend towards exit of some high-cost producers, which will be accelerated by the increased abatement costs.

Other Effects

Because the increase in the price of lead that can be expected to follow imposition of abatement costs is small, and because the demand for lead is very price inelastic, the trends in lead consumption with abatement

costs will not be significantly different from those predicted in the absence of abatement costs.

It is difficult to measure precisely the net employment effects of the relative decline of the high-cost mining sector and the relative expansion of the low-cost sector. As the high-cost mining sector is more labor intensive than the low-cost, some net loss of employment can be expected. The severity of employment loss is likely to be felt in the regions where they occur. Mining and smelting employment in Montana and Idaho can be expected to decline, particularly in Montana. About 200 Montana smelter employees at most would become unemployed if the lead smelting there was discontinued; although few employment alternatives exist in that region. As about 70 percent of the lead concentrates smelted here are obtained abroad, the impact on domestic mining employment might not be substantial. About 2 percent of Montana employment, or 4,400 people, are engaged in mining of all types, and the unemployment rate for the state in 1970 was 5.4 percent.

Lead smelting in Idaho and Texas is less likely to be discontinued. If it is, the impact will be somewhat greater in Idaho than in Texas, where the lead is smelted in a relatively large urban industrial region and where total mining employment is very large. About one-half of the lead concentrates processed in Texas are obtained abroad.

It is difficult to assess the net impact of high-cost smelter shutdowns on the balance of payments.

The United States imports about $100,000,000 worth of lead in various forms and exports a value of about $4,500,000. About three-quarters of the value of imports are in metal form and about one-quarter in ore, flue dust, fume, and matte. Since the smelters most likely to shut down are importers of concentrates, the change in this category of imports will to some extent offset the likely increase in imports of lead in metal form. Increases in lead metal imports are likely to be small. Their share in domestic consumption has been falling, and this is not likely to be greatly affected by the amounts of imports induced by the expected small (if any) increase in the price of lead.

If the current 10 percent tariff surcharge on imports of lead is maintained to 1976, it will offset to some extent the increase in the production of costs of domestic producers caused by pollution abatement. In the less likely case of equal cost increments for all smelters, abatement costs represent a 17 percent cost increment for low-cost producers and almost a 12 percent cost increment for high-cost producers. Thus the tariff will increase the costs of foreign producers selling in the United States by somewhat less than pollution control will increase the cost of U.S. production. This would allow U.S. producers to increase price by 10 percent without loss of market share to imports, and leave the U.S. producers needing a much smaller increase in price to maintain the source of profit rates as in the absence of abatement costs. Thus the effects of pollution abatement on profit and

employment would be considerably less than if there were no surcharge. In the more likely case that the abatement costs fall more heavily upon high-cost producers, they will be faced with about a 23 percent cost increase while the low-cost producers experience virtually none. In this case an increase in the domestic price of 10 percent will only partially offset the competitive disadvantage of the high-cost smelters.

The situations will be the same if the present surcharge is replaced by equally large upward revaluations of the currencies of the foreign nations exporting to the United States. However, it is important to note that Canada, Mexico, Peru, and Australia -- the major exporters of lead to the United States -- are not the big balance of payments surplus countries that can be expected to have sharply revalued their currencies by 1976. If the surcharge has been dropped by 1976 while at the same time the countries exporting refined lead to the United States have revalued their currencies by less than 10 percent, all of the effects of pollution abatement on prices, U.S. output and employment outlined above will occur, although mitigated by whatever currency appreciation has taken place.

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